

AMENDMENTS TO THE SPECIFICATION

Page 1, delete the first full paragraph in its entirety and insert the following new paragraph:

The present invention relates to a catalyst for producing hydrocarbons from a mixed gas containing hydrogen and carbon monoxide as main components (hereinafter referred to as "syngas"), a process for producing the same, and a process for producing hydrocarbons. More specifically, it relates to a process for producing hydrocarbons, particularly hydrocarbons which ~~contains~~ contain a ~~little~~ low amount of C₁ to C₄ gaseous components and ~~is~~ are rich in a kerosene and gas oil fraction and wax components easily convertible into the kerosene and gas oil fraction.

Delete the full paragraph bridging pages 2/3 in its entirety and insert the following new paragraph:

Incidentally, in recent years, a ~~light-gas~~ oil of a low sulfur content has been desired from the viewpoint of air environmental conservation, and this trend may still more increase hereafter. Moreover, from the viewpoint that crude oil ~~resource~~ resources are limited, it is desired to develop an alternative energy source and this development may be increasingly desired hereafter. As a technology responding to these requests, GTL (gas to liquids) is present, which is a technology synthesizing liquid fuels such as kerosene and ~~light-gas~~ oil from natural gas (main component: methane gas) whose minable reserves are said to be comparative to crude oil in terms of energy. Since natural gas contains no sulfur or, even if contains, ~~only~~ hydrogen sulfide (H₂S) and the like which are easy to desulfurize, the resulting liquid fuels such as kerosene and ~~light-gas~~ oil hardly contain sulfur and possess an advantage that they can ~~utilize~~ be utilized as high-performance diesel fuels having a high cetane number, so that GTL has recently attracted increasing attention.

Page 4, delete the first full paragraph in its entirety and insert the following new paragraph:

As another method for further enhancing the yield of the kerosene and gas oil fraction, it is considered to be effective to use a catalyst having an excellent performance ~~that~~ whose hydrocarbon-producing ability, i.e., activity is high, yields of gaseous components ~~is~~are low, liquid yields and chain growth probability are high, and ~~the~~ activity is stably exhibited for a long period of time.

Delete the full paragraph bridging pages 13/14 in its entirety and insert the following new paragraph:

In the process for producing the catalyst of the invention, examples of the manganese oxide of the support composed of a manganese oxide and an aluminum oxide preferably include MnO, Mn₃O₄, Mn₂O₃, MnO₂, and the like. In addition, using various manganese salts such as manganese nitrate, manganese carbonate, and manganese acetate as starting materials, manganese oxides obtained from these salts may be also employed. For example, Mn₂O₃ or the like obtained by calcination of manganese nitrate in the air can be preferably used.

Page 14, delete the first full paragraph in its entirety and insert the following new paragraph:

As examples of the aluminum oxide, use can be made of those in various crystalline state such as α , β , γ , η and Θ , or hydrates of aluminum oxides, such as gibbsite, hyalite, and boehmite. These aluminum oxides can be produced by hitherto known methods. For example, they are obtained by pyrolysis of the above hydrates of the aluminum oxides. The hydrates of the aluminum oxides are obtained by hydrolysis or pyrolysis of aqueous solutions of various aluminum salts such as aluminum chloride, aluminum nitrate, and alkali

aluminates. Aluminum oxides (particularly, γ -aluminum oxide) obtained by calcination ~~these and~~ having a low crystallinity, such as boehmite, are more preferable than aluminum oxides obtained by calcination of hydrates of aluminum oxides containing a large amount of ~~these aluminum oxides~~ having a high crystallinity, such as ~~hyalite-bayerite~~ and gibbsite, because of the large specific surface area and pore volume thereof. Furthermore, aluminum oxides obtained by a sol-gel process wherein aluminum alkoxides such as aluminum isopropoxide are hydrolyzed can ~~be also~~ be preferably used because of their large specific surface area and pore volume.

Delete the full paragraph bridging pages 16/17 in its entirety and insert the following new paragraph:

A ruthenium compound is supported on the support obtained as mentioned above. The supported amount of the ruthenium compound is from 0.5 to 5% by weight, preferably from 0.8 to 4.5% by weight, more preferably from 1 to 4% by weight, in terms of ruthenium metal on the basis of the catalyst before the above treatment with an aqueous alkaline solution and the above calcination treatment. The supported amount of ruthenium is relevant to the number of active ~~site~~ sites. When the supported amount of ruthenium is within the above range, a sufficient number of the active sites is obtained and the interaction with the components of the support is also sufficient, which may result in excellent catalytic activity and selectivity.

Page 21, delete the first full paragraph in its entirety and insert the following new paragraph:

In the invention, the catalyst subjected to the above treatment with the aqueous alkaline solution is baked in the air. The calcination temperature is from 150 to 500°C, preferably from 200 to 450°C from the viewpoint of enhancement of catalytic activity by calcination treatment and suppression of a decrease of the number of active sites which may be induced by the progress of excessive aggregation of ruthenium metal. The calcination time depends on an

amount to be treated but is usually from 1 to 10 hours in consideration of the effects expressed by calcination treatment and workability and productivity. In fact, even when the calcination time exceeds 10 hours, the enhancement of catalytic activity by the calcination is about the same as in the case of 10 hours or less, so that the time of 10 hours or less is preferred. In this connection, it is essential to conduct the calcination treatment in the air and a sufficient enhancement of catalytic activity is not observed under a reductive condition.

Page 23, delete the first full paragraph in its entirety and insert the following new paragraph:

As examples of the aluminum oxide, use can be made of those in various crystalline state such as α , β , γ , η , and Θ , or hydrates of aluminum oxides, such as gibbsite, ~~hyalite~~bayerite, and boehmite. These aluminum oxides can be produced by hitherto known methods. For example, they are obtained by pyrolysis of the above hydrates of the aluminum oxides. The hydrates of the aluminum oxides are obtained by hydrolysis or pyrolysis of an aqueous solution of various aluminum salts such as aluminum chloride, aluminum nitrate, and alkali aluminates. Aluminum oxides (particularly, γ -aluminum oxide) obtained by calcination, and those having a low crystallinity, such as boehmite, are more preferable than aluminum oxides obtained by calcination of hydrates of aluminum oxides containing a large amount of those having a high crystallinity, such as ~~hyalite~~bayerite and gibbsite, because of large specific surface area and pore volume. Furthermore, aluminum oxides obtained by a sol-gel process where aluminum alkoxides such as aluminum isopropoxide are hydrolyzed can be also preferably used because of large specific surface area and pore volume.

Delete the full paragraph bridging pages 23/24 in its entirety and insert the following new paragraph:

Furthermore, it is an important factor that the aluminum oxide constituting the catalyst to be used in the invention has a specific pore structure. Namely, by using an aluminum oxide in which the pore volume formed by pores having a pore diameter of 8 nm or more accounts for 50% or more, preferably 60% or more, more preferably 70% or more, of total pore volume, a good FT reaction which exhibits a high activity and is excellent in C5+ productivity can be ~~promoted~~ obtained and also the activity can be maintained for a long period of time. A precise mechanism ~~of expression of wherein~~ the effects are expressed is currently being intensively investigated and ~~it is~~ not yet clear but is considered to be as follows: in the case that the pore volume formed by pores having a pore diameter of 8 nm or more accounts for 50% or less, that is, relatively small pores are main pores, diffusion of higher hydrocarbons such as waxes formed by the FT reaction to outside the pores and diffusion of a syngas, a starting gas, to inside the pores, are suppressed.

Page 24, delete the last full paragraph in its entirety and insert the following new paragraph:

The total pore volume of the aluminum oxide is not particularly prescribed but is preferably 0.3 cm³/g or more in consideration of the dispersibility of the active metal. Moreover, the upper limit is also not particularly prescribed but is preferably 1.2 cm³/g or less because too large a pore volume may result in a decrease of mechanical strength and the possible occurrence of pulverization of the catalyst during the reaction as well as ~~from a technical viewpoint~~ in the production thereof.